

DATA REVIEW OF THE CHROMOSOMAL NUMBER OF SOME PLANTS IN THE REGION OF ELBASAN

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ABSTRACT

The present study gives a description of chromosome number of five species in Elbasan region. The species are as follows: *Lilium martagon* L. $2n = 24$, *Ornithogalum exscapum* Ten., $2n = 18$, *Scilla bifolia* L. $2n = 18$, *Hermodactylus tuberosus* (L.) Miller $2n = 20$, *Aster albanicus* Degen $2n = 18$.

This is part of a cytological study of some spontaneous species in Albania Flora. The species taken in consideration are endangered, spontaneous and decorative ones in Elbasan flora. The determination of chromosome numbers is based on the study of root tip mitosis.

From the experimental data, it is observed that the chromosomal number of these species, not previously studied in Elbasan region, is in accordance with the literature data and information for these species. This is an ongoing study focused, as well in determination of chromosomal formula for these species.

KEYWORDS: Chromosomal Number, Mitosis, Association, Endangered Species

INTRODUCTION

The purpose of this study is the determination of the chromosomal number and chromosome morphology for some rare and endangered plant species with special economic and medical importance in spontaneous flora, as a part of Albanian flora biodiversity study.

The species taken in consideration are: Monocotyledon: Fam:Liliaceae with the species: *Lilium martagon* L., *Ornithogalum exscapum* Ten., *Scilla bifolia* L.; Fam: Iridaceae with the species *Hermodaktylus tuberosus* (L) Miller. Dicotyledonous: Fam: Compositae with the species *Aster albanicus* Degen.

The populations taken in study are gathered from Elbasan region, which lays in the boundary between two physic-geographical areas of Albania, with an average area of 1482 km² and an average altitude of 450 m over the sea level (Qiriazhi & Vranaj, 1998). The plant diversity of this region has been described by several authors (Topuzi, 1985), (Kapidani, 1996), (Naqellari, 1999), (Pupuleku, 2002). However, the karyotype study of the populations in Elbasan region has been undertaken for the first time. This paper represents a review of the data about the chromosomal number of the selected species for a five year period of time.

Several references has been consulted, including Baltisberger et al.(1991), Dyer F. A. (1979), Seberg et al., (1991), Strid et al., (1991), Tutin et al., (1964-1980), Van Loon, (1987), (Zekaj et al., 2001), Qosja & Puto, (1982-1983), Šopova & Sekovski, (1981),(1982).

MATERIALS AND METHODS

The plant material has been gathered from several expeditions during different months, in different areas (2002-2006). Whole plant were used for the study with soil, oniony and tubers, taken from their natural environment, and then grown in the mini-greenhouse of Biological Research Institute, and in the mini-greenhouse at “Aleksander Xhuvani” University, and growing seeds in Petri dishes.

The botanical determination of these species has been accomplished by the systematic, such as Prof. Dr. Alfred Mullaj, Prof. Ass. Dr. Peçi Naqellari, Vangjel Tartari, Ing. Hasan Deliu. The identifications of these species and the data comparison is based on Tutin et al., (1864-1980) and Vangjeli et al., (2000). Herbariums of these species are deposited next to the National Herbarium of Biological Research Institute in Tirana and next to “Aleksander Xhuvani” University in Elbasan. The cyto-karyological studies for these species are carried out with the special and generous help and with the valuable collaboration of Prof. Dr. Zhaneta Zeka.

The methodology of cytological processing of the plant material is based on the standard technique (Capineri R. et al. 1978) described by Dyer A. F. (1979). The used techniques includes preparation pressing. The roots from the plants or from the grown seeds undergo the preliminary treatment with colchicine solution 0.05 – 0.05% in accordance with the plant species in study (Meyer, 1943) for about 4 – 6 hours, then fixed in Carnua (3 parts of absolute ethylic alcohol and 1 part of glacial acetic acid) for 3 – 12 hours for mitosis in room temperature. The plant material is then transferred in HCl 1N for 5 – 6 minutes (depending on the species) in 60°C. The plant material is colored with orseine. The colored tips are then pressed with a drop of acetic acid 45% by Dyer, A. F. (1963). For the major part of the plants, 24 – 48 hours before taking the roots, the vases are treated with water and then are kept in continuous light, so that the cells could be more active.

For some plant species, some stages in the standard techniques are modified, such as hydrolysis and coloring. The enclosure of the chromosomal preparations is made with Canadian balm. The fixation of the preparation is realized with digital Canon 5.1mg pixel. For the plants, the drawing and the direct measurement from the computer photos of metaphases plates taken with Olympus microscope based on Microgiciel computer program is used. The calculation techniques of chromosomal classification parameters and average error are used.

The best metaphases’ of the preparations are photographed with the Olympus microscope based on microgiciel program. The cytological preparations are stored in Cytology and Cytogenetic Laboratory of Biological Research Institute in Tirana, nowadays the Department of Biotechnology in Natural Sciences Faculty next to Tirana University.

RESULTS AND DISCUSSIONS

Family: Liliaceae

Gender: Lilium L

***Lilium Martagon* L. – 2n = 24**

The species *Lilium martagon* L. has been spread from Northeastern France, Estonia, towards Central Ural till in Central Spain and Central Greece. It can be found also in Al, Au, Bu, Co, Cz, Ga, Ge (Tutin et al., 1964-1980). It is described as a variable cultivated and naturalized species in Europe by Strid & Franzen (1981), which are mentioned in Van Loon, (1987).

The main goal of the study is the population in the mountain Guri i Zi, 1149 m alt; N 41°12'53,4"; E 020°08'22.9", next to the road, with rocky lands, and humus mountain shrub lands.

All plants taken in study from this population have $2n=24$ (Figure 1). This number is in accordance with the previous data by Lovka et al., (1971), Šopova, (1971), Lovka et al., (1972), Strid & Franzen (1981), as mentioned in Van Loon, (1987). This number is confirmed also by Vangjeli et al., (2000).

Some metaphases with B chromosomes are found. Dyer F. A. (1979) determined $x=12$ and $2n=24+0-3B$ (B chromosome). The presence of B chromosomes is confirmed also by Tutin et al., (1964-1980) in Europe Flora, where $2n=24+0-2B$. The chromosomes are big with the typology: metacentric, submetacentric, subtelocentric, telocentric.

Gender: Ornithogalum L

***Ornithogalum Exscapum* Ten. – $2n=18$**

The species *Ornithogalum exscapum* Ten described as Mediterranean plant is spread in Al, Co, Gr, Hs, It, Ju, Se, S (Tutin et al., 1964-1980). The study includes the population in Gjinar next to Elbasan-Gjinar road, over Shelcan, 689-691 m alt; N 41°03'11, 7"; E 020°08'18.3" in dry pastures.

$2n=18$ resulted from all plants taken in study in the population (Figure 1). This number is in accordance with the previous data determined by LANDSTRÖM, (1989) in Greek material, TORNADORE & GARBARI, (1979) described by Strid Arne. (Strid et al., 1991) in Italy. This number is confirmed in Europe Flora (Tutin, et al., 1964- 1980), and in Albania Flora (Vangjeli et al., 2000). In diploid plants of these population there are also found metaphases with $2n=16, 17, 19$ (nearly 20% of the total number of observed metaphases). This represents a low percentage of these metaphases. These metaphases could be result of chromosomal rupture, doubling of broken parts. These metaphases could be also result of numbering in non-clear fields or removing of some chromosome because of the cell wall explosion. $2n=18$ is determined for the first time for the plants of this species by Puto, L. for a population in Elbasan, cited by Qosja & Puto, (1982-1983). The chromosomes have big sizes and are of the methacentric, submethacentric and subtelomeric type. Our data for the karyotype of *Ornithogalum exscapum* Ten., Gjinar population, are published for the first time

Gender: Scilla L

***Scilla Bifolia* L. – $2n=18$**

Scilla bifolia L., is a heliophyte plant. It has a Central European – Caucasian spread. Carpinion, Fagion, Quercetalia pubescentis. Šopova & Sekovski, (1981) describes it as a very common species in Mediterranean and in Macedonia. This species plants are taken in Gjinar population in pine forest, 1021 m alt; N 41°01'10,9"; E 020°12'16.5", 1 km from Gjinar next to Gjinar – Bukanik road.

The chromosomal number in all examined plant was $2n=18$ (Figure 1). This number is in accordance with the previous data determined by Moskova & Georgieva (1972), Šopova & Sekovski (1981), $2n=18, 36$ by Susnik & Lovka (1973) cited in Van Loon et al, (1987), by Speta (1974, 1977), Greilhuber & Speta (1977, 1985), Trávníček (1996, 2002) (Kochjarová J., 2005). The literature suggest $2n=36$ for this species by Šopova & Sekovski (1982) and by Susnik & Lovka (1973), cited in Van Loon et al, (1987). $2n=18, 36, 54$ is confirmed in Tutin et al., (1964-1980), Vangjeli et al., (2000). The determination of chromosomal number for *Scilla bifolia* L., Gjinar population is done for the first time in this paper.

Family: Iridaceae

Gender: Hermodactylus Miller

***Hermodactylus Tuberosus* (L) Miller – 2n=20**

Its populations are described with a spread in Mediterranean areal, from east to southeastern France, and with a suspect spread in Albania (Tutin et al., 1964-1980). It is found for the first time in Shkoder by Höpflinger F. (1964). The plant of this species are gathered from the population in Fikas, Krrabë, Elbasan region, 385 m alt., N 41°06'03,5"; E 020°00'28.6", neary 200 m down the national road Elbasan Tiranë.

The chromosomal number was 2n=20 in all the plants (Figure 1). This number is in accordance with the chromosomal number determined in Van Loon, (1987), Kamari et al., (2000). The species chromosomal number for this population is presented for the first time in this paper. Metaphases resulted from our preparation 2n=19 (10%), 2n= 22 (5%). These methaphasis could be result of chromosomal rupture, or doubling of broken parts. But they could result from numbering in non-clear fields, or from chromosome removal as a consequence of cell wall explosion. The chromosomes have average sizes and are of metacentric and submetacentric type.

Fam: Compositae

Gender: Aster L

***Aster Albanicus* Degen – 2n=18**

This species is spread in mountains, in the border between Jugosllavia and Albania Al, Ju (Tutin et al., 1964-1980). In albania, it is spread mainly in dry and rocky places, especially ultra basic (200-2100 m), and in coastal sand, with moderate humidity *Genistetum Hassertianae e Buxeto-Festucopsidetum.(ssp.albanicus.)* (Vangjeli et al., 2000). This species plant are taken in Librazhd population 233-240 m alt, N 41°11'02,5"; E 020°16'20.8", in ultrabasic serpentine rocks, covered with plants, next to Elbasan-Librazhd road. Status R (rare) (Group of authors, 1997).

For all the plants taken in study from the population 2n=18 (Fig. 1/5). This number is in accordance with the previous date determined by Dyer, (1963), and Vangjeli et al., (2000). The taxon of *Aster albanicus* has no description in Cytotaxonomical Balcan Atlas (Van Loon, 1987). 2n=18 is also determined by L Puto for the population in pine forests near Durres (Qosja Xh & Puto L. 1983) and Zekaj et al.,(2006). The chromosomes have big and small methacentric and submetacentric typology.

CONCLUSIONS AND RECOMMENDATIONS

The chromosomal number has been determined for the first time of 5 spontaneous plant species with special economic and medical importance in populations of Elbasan region.

The chromosome morphology has been studied as well, characterizing the typology for each species.

The data in this study are in concordance with the literature data determined by foreign and Albanian researchers.

This research gives an important contribution in the enrichment of Albania Flora, complementing the chromosomal number for the specie *Hermodactylus tuberosus* Mill. Identification of the endangered species, their collections, chromosomal certification including other biological parameters, would contribute in the preservation of population biodiversity according to their natural habitat.

The increase of this kind of studies would contribute in the whole plants certification and in the compilation of chromosomal atlas for the plants in Albania.

The continuous pursuit of rare and endangered plant areas would help in determining the degree of destruction and their protection.

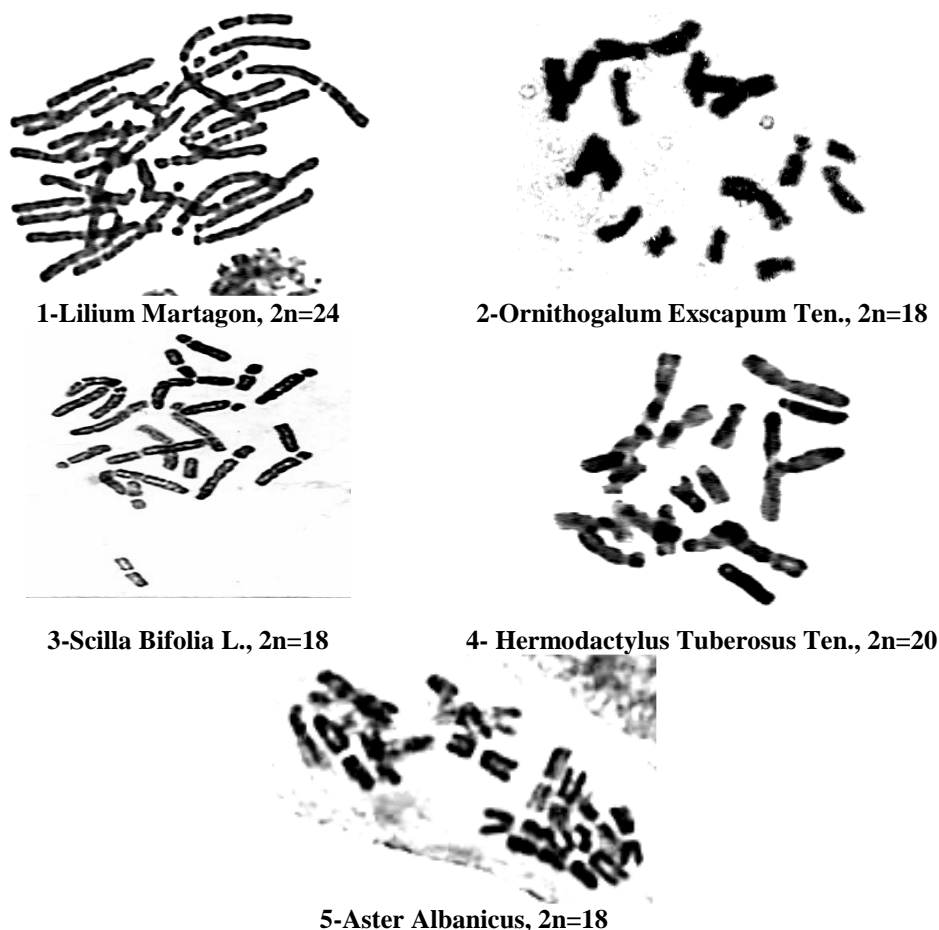


Figure 1: Caryotypes in Plants Taken in Study

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